CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

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Project Title: Yeni Yashma Wind Farm
PDD version: 04
Date: 12/05/2011

Document history:
PDD version 01; 04/02/2011
PDD version 02; 04/04/2011
PDD version 03; 20/04/2011

A.2. Description of the project activity:

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Summary:
Aztorq LLC and Caspian Management Systems LLC are co-developing the Yeni Yashma Wind Farm project (hereafter referred as the proposed project) near Yeni Yashma settlement of Khizi Region in Azerbaijan.[1] Khizi region is in the economical zone of Abscheron, which is known as the most promising site in terms of wind speed in the East along the Caspian Sea.

The objective of the proposed project activity is to generate electricity from renewable wind resources. The proposed project activity involves the installation of 20 units of Fuhrlander FL 2500/90 wind turbines with a capacity of 2.5 MW each, reaching a total installed capacity of 50 MW.[2] An estimated net electricity generation of 196,000 MWh/year will be produced by the project activity and delivered to the national grid of Azerbaijan.[3] The annual emission reductions are estimated as 120,898 tCO_2eq/year.

The electricity generation mix in Azerbaijan grid is dominated by fossil fuel fired power plants significantly from natural gas and fuel oil. The total installed capacity in Azerbaijan is 6,428 MW, while 84% of this capacity belongs to thermal power plants and only 16% consists of hydroelectric power plants (HPPs)[4]. There are no wind farms commercially operating in Azerbaijan. The significant share of thermal power plants in the electricity generation has an adverse effect on air quality especially with regards to

[1] Due to local legislation a private company can only receive a certain amount of loan from a creditor which exceeds the amount of loan granted for the proposed project activity. This threshold has forced the project owners to divide the project into two segments of 25MW + 25 MW developed by two companies Aztorq and Caspian Management Systems LLC. Caspian Management System LLC and Aztorq LLC are two sister companies under the umbrella of General Construction Holding (www.gcc.az). Aztorq LLC is a project participant for the proposed project.

[2] Although there are some plans to increase the capacity of the proposed wind farm to 100MW in the future, currently the feasibility of this option is being evaluated by the Project Participants and there are no concrete steps towards increasing the capacity.

[3] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park.

[4] Reference: AzerEnerji official website www.azerenergy.com

greenhouse gas (GHG) emissions in Azerbaijan. The energy sector is thereby the major source of CO_2 emissions[5], which is also the main source of baseline emissions.

The project activity aims to reduce GHGs by replacing electricity generation from the Azerbaijan national grid system with electricity generation from wind energy, which has zero emissions. The scenario prior to the implementation of the project activity is the same as the baseline scenario detailed more under section B.4 of this document.

Contribution to Sustainable Development:
Renewable wind energy is an energy source that offers various environmental benefits. In contrast to other energy sources, wind energy does not result in emissions of pollutants into the atmosphere, nor does it emit residuals that can have an impact on soil and water. The net result is a reduction of fossil fuel consumption that would occur in current power stations so as to produce an equivalent amount of energy. At the same time, wind energy is a renewable source. So it does not endanger the supply of energy for future generations.

The project contributes significantly to the region's sustainable development in the following ways:

- Wind energy is a renewable energy source. Unlike fossil fuels, it does not reduce the availability of energy for future generations.
- Reduction of greenhouse gas emissions and other pollutants in Azerbaijan by replacing electricity otherwise generated by the Azerbaijan national grid, which has a large share of fossil fuel power generation.
- The project also reduces other emissions than GHG such as emissions of sulfur dioxide, nitrogen oxides, and particulates. In turn it contributes to local improvement of air quality.
- The project strengthens the involvement of Azerbaijan in renewable energies and low carbon power production through the use of market mechanisms.
- Creation of local employment both during the construction and operational phase. Based on 2009 figures, the unemployment rate is 6% in Azerbaijan[6]. It is planned to provide 8 long term job opportunities during the operational phase, which will have its most impact on improving employment quality of local people.
- Technology and know-how transfer.
- Power supply improvement to the Azerbaijan grid both for domestic and commercial consumers.
- Diversification of electricity generation technologies in Azerbaijan, which is currently dominated by natural gas fired power plants.

Additionally, no major negative impacts are expected as confirmed by the environmental impact assessment study

[5] Reference: The State Statistical Committee of Azerbaijan, Protection of Atmosphere
http://www.azstat.org/statinfo/environment/en/008.shtml

[6] Based on State Statistical Committee of Azerbaijan, main social-economic indicators of the labour market statistics for 2009; there are 260.2 thousand unemployed among 4331.8 thousand economically active population. Reference: http://www.azstat.org/statinfo/labour/en/001_1.shtml

A.3. Project participants:

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Name of Party involved (*) (host indicates a Host Party)	Private and/or public entity(ies) project participants (*) (as a applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Azerbaijan (host)	Aztorq LLC (private entity)	No
United Kingdom	Orbeo (private entity)	No

Full contact information for the project participants are provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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Republic of Azerbaijan

A.4.1.2. Region/State/Province etc.:

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Administrative territory of Yeni Yashma of Khizi Region

A.4.1.3. City/Town/Community etc.:

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The project is located in Yeni Yashma of Khizi region of Azerbaijan Republic, in the eastern slopes of Gretaer Caucasus mountain range, at 49th kilometre of Baku Rostov highway. The location of installation is located between Samut-Apsheron canal and Yashma power line. Khizi Region has a low density of population with 8 persons per 1 km^2 and is 104 km away from Baku.[7]

[7] Reference: Yeni Yashma project Evaluation of Environmental Impact available to the DOE.

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

Figure 1 The geographic location of the proposed project activity

Table 1 Coordinates of the wind turbines[8]

Wind Turbine	Coordinates (Decimals Latitude, Longitude)
1	40.739722, 49.43222
2	40.735278, 49.433333
3	40.732778, 49.438056
4	40.728333, 49.438889
5	40.725833, 49.443611
6	40.721389, 49.444722
7	40.737778, 49.428889
8	40.733333, 49.43
9	40.730833, 49.434444
10	40.726667, 49.435556
11	40.724167, 49.44
12	40.719722, 49.441111
13	40.736111, 49.425278
14	40.731667, 49.426389
15	40.729167, 49.430833
16	40.724722, 49.431944
17	40.722222, 49.436667
18	40.717778, 49.4375
19	40.734167, 49.421944
20	40.734167, 49.422778

A.4.2. Category(ies) of project activity:

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The proposed project involves in renewable energy generation and supply to the grid and falls under the Sectoral Scope 1, Energy Industries.

A.4.3. Technology to be employed by the project activity:

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The proposed project activity involves the installation of 20 units of wind turbines with a total installed capacity of 50 MW. The project is expected to generate 196,000 MWh/year[9] of net electricity. This ex-ante estimate of annual electricity generation is based on a load factor of 44.75% established by the third

[8] Reference: airwerk GmbH, conferdo GmbH & Co. KG, 27/10/2009: Position wind power turbines

[9] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park.

party Mitaki Project GmbH. [10] It was determined by evaluating the yearly average wind speed against the potential annual output for that wind speed for the specific turbine used, as established by the IEC 61400-12.[11] It is planned to install Fuhrlander JCS FL 2500 – 90 type wind turbines with 2.5 MW capacity each. This turbine type is selected based on the measured wind speeds for the project site,[12] which correspond to the specifications (wind class, turbulence conditions, etc.) of the Fuhrlander FL 2500 – 90. The key technical specifications of the turbines are as follows:

Table 2 Key technical specifications of wind turbines[13]

Parameter	Value
Manufacturer	Fuhrlander AG
Model	FL 2500 – 90
Power rating	2500 kW
Rotor diameter	90 m
Area of coverage	6,362 m^2
Slope angle	5°
Total weight (rotor)	Approx 52 tons
Blade material	High quality glass fibre plastic
Blade length	43.8 m
Generator	4 polar, 3 phase non synchronous
Regulation of rotor speed	Inverter
Generator nominal output	2500 kW
Nominal voltage	690 V
Wind class	IEC 2a

The proposed project activity will also involve:
- construction of a management building
- construction of a 9 km road from the highway to the project area
- transformer station for the connection to the distribution line
- installation of monitoring equipment

[10] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park.

[11] IEC 61400-12 Wind turbine power performance testing standard of the International Electrotechnical Commission. See Table of Turbine and Wind speed specific outputs in Mitaki Project GmbH 2009: Memorandum for Yeni Yashma Wind Park (page 19).

[12] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park.

[13] Fuhrländer FL 2500: http://www.fuhrlaender.de/downloads/downloads/FL_2500_eng__web.pdf (page 11)

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

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Years	Annual estimation of emission reductions in tonnes of $tCO_2.eq$
01/09/2011-31/12/2011[14]	40,299
2012	120,898
2013	120,898
2014	120,898
2015	120,898
2016	120,898
2017	120,898
01/01/2018-31/08/2018	80,599
Total emission reductions (tonnes of CO_2-eq)	846,285
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2-eq)	120,898

A.4.5. Public funding of the project activity:

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No public funding from the Annex I countries is provided to the proposed project.

[14] For ex-ante calculation of the emission reductions in 2011, it is estimated that the project activity will be registered within August 2011.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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Applied approved baseline and monitoring methodologies:

- Approved consolidated baseline methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 12.1

Used tools:

- "Tool for the demonstration and assessment of additionality", version 5.2
- "Tool to calculate the emission factor for an electricity system", version 2

For more information regarding the methodology please refer to
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

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The methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1), is applicable to grid-connected renewable power generation project activities that

a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield project);
b) involve capacity additions;
c) involve a retrofit of (an) existing plant(s), or
d) involve a replacement of (an) existing plant(s).

The proposed project activity is applicable to the methodology ACM0002 (version 12.1) because:

- The proposed project activity is a grid-connected wind power generation project that (a) installs a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity.
- The proposed project activity does not involve switching from fossil fuels to renewable energy sources at the site of the project activity.

The proposed project activity further meets the applicability criteria for ACM0002 (version 12.1) and the "Tool to calculate the emission factor for an electricity system" (version 2) because:

- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.
- The project activity is a Greenfield project which substitutes grid electricity by supplying electricity to a grid.

B.3. Description of the sources and gases included in the project boundary:

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Spatial Boundary:

As per ACM0002 version 12.1, the spatial extent of the proposed project boundary includes the project power plant and all power plants connected physically to the electricity system[15], which the proposed project activity is connected to. The region Nakhichevan Autonomous Republic that is not directly connected to the network of the CDM project activity is excluded from the boundary.

Emission Sources:

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 3 as followed:

Table 3 Emission sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	Project emissions	CO_2	No	There is no expected project emission related to the generation of electricity by wind turbines. This is also in line with the requirements of ACM0002 (version 12.1)
		CH_4	No	
		N_2O	No	

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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The proposed project activity is the installation of a grid connected new renewable power plant. The baseline scenario in accordance with ACM0002 (v12.1) for grid connected renewable power plant is as followed:

"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid connected power plants and the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system."

Therefore the baseline scenario for the proposed project is the equivalent annual net electricity supplied by the national grid system.

[15] Reference: Azer Enerji (Grid Operator for Azerbaijan) official website http://www.azerenerji.com/index.php?section=2

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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Timeline of the Project:
An overview of the implementation timeline of the proposed project is presented in the below table:

Table 4 Timeline of the proposed project activity

Event	Date
General Specifications of the Contract for the Yeni Yashma I Wind Park, issued by Mitaki Project GmbH (service provider), including a CDM feasibility section[16]	27.03.2009
"Prior Consideration" Notification Letter on proposed project sent to the DNA of Azerbaijan, in accordance with EB 41, Annex 46	08.06.2009
Power Purchase Agreement with the grid operator	31.08.2009
"Prior consideration" Notification letter sent to EB and listed on UNFCCC website, in accordance with EB 48 Annex 61 and EB 49 Annex 22	29.10.2009
Starting date of project activity: Contract with Mitaki GmbH became effective	17.11.2009
Term sheet for Emission Reduction Purchase Agreement signed	09.04.2010
Emission Reduction Purchase Agreement signed	13.10.2010
Construction permit	13.12.2010
Start of Global Stakeholder Publication	08.02.2011
Expected commissioning of the wind farm	June-October 2011

As per EB 41 meeting paragraph 67, the start date of a CDM project activity shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date of contracts for equipment or construction/operation services required for the project activity. In the light of above guidance, the date of when the Equipment Sales Contract with Mitaki Project GmbH (service provider) became effective is selected as the starting date of the project activity as it is the earliest date of real action took place. The conditions that were fulfilled in order for this contract to become effective were that the loan for financing the contract was ready for disbursement and subsequently that the first down payment of the contract was made. The date of first down payment is the project activity starting date.

Based on the events listed above, the project entity has been aware of the CDM and the decision was based on CDM revenues taken into account. The CDM was a vital for the project owner to go ahead with the implementation of the proposed project activity.

Approved consolidated baseline methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (v12.1), requires the use of the latest "Tool for demonstration and assessment of additionality" (v05.2) agreed by the CDM Executive Board to demonstrate and assess the additionality of the proposed project.

[16] Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park

The tool provides for a step-wise approach to demonstrate and assess additionality. These steps include:

- Identification of alternatives to the project activity;
- Investment analysis to determine that the proposed project activity is either 1) not the most economical or financial attractive, or 2) not economically or financially feasible;
- Barrier analyses; and
- Common practice analysis.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

According to CDM Validation and Verification Manual[17] (version 01.2), the PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required. Alternatives to the proposed project is not needed to be identified as the baseline scenario has been prescribed according to ACM0002 (v12.1) under section B.4.

Step 2. Investment analysis

Investment analysis has not been chosen for the demonstration of the additionality of the proposed project.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of the proposed CDM project activity:

According to the "Tool for the demonstration and assessment of additionality" (version 5.2) realistic and credible barriers that would prevent the implementation of the proposed project activity from being carried out if the project activity was not registered as a CDM activity should be established. Such realistic and credible barriers may include:

a) Investment barriers, other than economic/financial barriers
b) Technological barriers
c) Barriers due to prevailing practice
d) Other barriers

For the proposed project activity, the main barrier is identified as barriers due from prevailing practice as the proposed project is its first of its kind in Azerbaijan.

[17] Reference: EB 55 Annex 1 CDM Validation and Verification Manual (version 01.2), page 20 paragraph 105

Prevailing Practice

Azerbaijan has large reserves of oil and gas.[18] This acts as a disincentive for the promotion and development of the potentially significant renewable energy resources including wind energy.[19] As per 2010, the total installed capacity of Azerbaijan is 6,255 MW[20] with 11 thermal power plants with a total installed capacity of 5,252 MW and 6 hydroelectric power plants with a total installed capacity of 1,003 MW. A list of power plants, are presented in the below table as followed:

Table 5 List of power plants connected to the Azerbaijan national grid system[21]

Power Plants	Commissioning date	Capacity (MW)
Azerbaijan ThPP	1981	2,400
Shirvan ThPP	1962	1,050
Shimal CCPP	1960	400
Sumgait CCPP	2003	525
Baku ThEC	1973	107
Samgachal PP	2008	300
Baku PP	2007	104.4
Shahdag PP	2009	104.4
Astara PP	2006	87
Sheki PP	2006	87
Khachmaz PP	2006	87
Subtotal Thermal PP		**5,252**
Mingechaur	1953	401.6
Varvara	1954	16.5
Shemkir	1982	380
Yenikend	2000	150
Ter-Ter	1976	50
Vaykhur	2006	5.3
Subtotal Hydro PP		**1,003.4**
Total		**6,255**

[18] Reference: Energy Information Administration (EIA) 2010: http://www.eia.doe.gov/countries/cab.cfm?fips=AJ

[19] Reference: European Bank for Reconstruction and Development, Renewable Development Initiative: Azerbaijan Country Profile 2009: http://ebrdrenewables.com/sites/renew/countries/azerbaijan/profile.aspx

[20] Reference: Azerenerji, Azerbaijan Main Grid Operator: http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html

[21] Reference: Azerenerji,Azerbaijan Main Grid Operator: http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html

Despite the fact that Azerbaijan, specifically Absheron Economical Region (including the proposed project area) is known to be resourceful with regards to wind,[22] there is currently no wind farm operating commercially in Azerbaijan and the proposed project activity will be the first-of-its-kind in Azerbaijan.

Although there are some planned wind farm projects in Azerbaijan and 1 project under construction, there are no wind energy projects in commercial operation, as of February 2011.[23] Currently the only generation in the national grid is coming from a small pilot project located in Yeni Yashma region (Shurabad/Azerbaijan). The pilot project consists of 2 wind turbines with a capacity of 850 kW each. There is also a wind turbine erected in April 2009 with a capacity of 500 kW at the highway M2 between Sumgayit and Quba as a training centre for Institutes of Academy. However these turbines are generating insignificant amounts of electricity and are operating as pilots only.[24] In addition to the proposed project, there is one wind project currently under construction in Azerbaijan: the Shurabad Wind Power Project. This wind farm, with expected 48 MW installed capacity, is expected to commission in the second quarter of 2011[25] and intends to apply for CDM registration.[26] As of the date of Global Stakeholder Publication of the Proposed Project, there were no commercially operational wind farms in Azerbaijan and no other projects published for CDM Global Stakeholder Consultation. In accordance with the guidance in the "Note on the barrier first of its kind" (CDM –Meth Panel 34th Report, Annex 10), it is thereby confirmed that the proposed project is the first of its kind.

Currently there are no national and/or sectoral policies in place that provide a comparative advantage to renewable energy, especially wind energy applications. A "State Program on Utilization of Alternative and Renewable Energy Generation in Azerbaijan" was approved and published on 21 October 2004.[27] This document basically notes that Azerbaijan has a significant potential for renewable energy and therefore it should be utilized. However, it fails to provide any kind of concrete plan or policy towards how to achieve this. Based on this program, an Alternative and Renewable Energy Agency was established under the Ministry of Industry and Energy in 2009, as the main regulatory institution in the sphere of alternative and renewable energy. In the past two years, however, the Agency has made little progress: although the development of renewable energy is one of the government's strategic priorities, the legal and institutional environment are not yet attractive for potential investors.[28] A favorable legal and regulatory framework is still to be created in Azerbaijan.[29]

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[22] Reference: European Bank for Reconstruction and Development, Renewable Development Initiative, Azerbaijan Country Profile 2009: http://ebrdrenewables.com/sites/renew/countries/azerbaijan/profile.aspx, page 3

[23] Date of Global Stakeholder Publication of the proposed project was 08.02.2011.

[24] Reference: Alpha Company Presentation 2009 http://www.osce.org/baku/40179

[25] Reference: http://en.apa.az/news.php?id=136295

[26] Reference: http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html (see Host Country: Azerbaijan) and http://www.gfa-group.de/envest/projects/gfa_envest_projects_eng_3477106.html

[27] Reference: Presidential Decree N462, 02/10/2004: http://www.carecinstitute.org/uploads/docs/AZE-Renewable-Energy-Strategy-en.pdf

[28] Reference: UNDP Azerbaijan 2011: http://www.un-az.org/undp/xeberler.php?article_id=20110214034315567&page=0500&lang=eng

[29] Reference: OSCE, Azerbaijan Ministry of Energy, Final conference Report http://www.osce.org/baku/41259 (Conclusions and Recommendations, page 14)

In 2009, the Tariff Council of Azerbaijan developed a wind tariff model that would make wind more attractive to investors.[30] However the current tariff of 4.5 copeck/kWh (4 Eurocent/kWh) is not sufficient to promote wind energy in Azerbaijan. To support this, is a study by the International Energy Agency (IEA) which sets the minimum feed-in tariff to 7 Eurocent/kWh, in order to witness deployment effectiveness of this type of remuneration scheme.[31]

Furthermore, there is a lack of interest and governmental support of renewable energy development in Azerbaijan, due to favourable status of the power lobby, and the dominance of the oil and gas industry.[32] Lack of technical capacity to act on these investment interests have prevented further action towards renewable energy. Finally, the electrical infrastructure is in poor condition. Investment is currently being focused on improving the electrical infrastructure.[33]

As a nature of being first, the project could be considered to face all the barriers that could be attributed to an immature sector. Currently, Azerbaijan is lacking financial and technical experience on wind energy and there are no effective tools or instruments in place to promote wind energy development and to encourage the private sector to implement wind energy in Azerbaijan. This is clearly demonstrated by the penetration rate of wind energy in the country, which lies at 0% of the total energy generation (see Table 5).

CDM helps to alleviate these above mentioned hurdles of being a first of its kind project in the renewable energy sector of Azerbaijan. CDM is considered to be a working mechanism in providing an incentive for the implementation of renewable energy projects and an attractive tool which can encourage project developers in implementing projects. Consequently, CDM will have the potential to pioneer a new sector to be realized in Azerbaijan.

In conclusion, although Azerbaijan is aware of its renewable energy potential, there is lack of concrete and effective steps towards promotion of renewable energy in the country. Azerbaijan is still in the phase of developing its legislative structure to facilitate renewable energy projects but fails to provide any real policy or strategy towards utilization of renewable energy in the country.

Technological barriers

In addition to being the first of its kind in Azerbaijan, the proposed project is also the first wind project to be developed by the project participant Aztorq and its co-developer Caspian Management Systems. These two project developers are facing barriers due to the lack of experience, technological know-how and skilled labour.

To objectively demonstrate the existence of technological barriers in general terms is the penetration rate of wind power technology in Azerbaijan. As described in the "prevailing practice" barrier above, the

[30] Reference: The Tariff Council of Azerbaijan Republic http://www.tariff.gov.az/?/en/resolution/view/5/

[31] Reference: OECD/IEA 2008: Deploying Renewables Executive Summary: http://www.iea.org/Textbase/npsum/DeployRenew2008SUM.pdf

[32] Reference: European Bank for Reconstruction and Development, Renewable Development Initiative: Azerbaijan Country Profile 2009: http://ebrdrenewables.com/sites/renew/countries/azerbaijan/profile.aspx

[33] Reference: European Bank for Reconstruction and Development,Renewable Development Initiative Azerbaijan Country Profile 2009: http://ebrdrenewables.com/sites/renew/countries/azerbaijan/profile.aspx

project is the first of its kind. The technology penetration is thereby less than 10% in the country. According to official statistical data published by the State Statistical Committee of Azerbaijan, only 0.01 % of the total Azerbaijan electricity generation in 2009 comes from wind power.[34] As per the Guidelines for the Objective Demonstration and Assessment of Barriers (EB 50 Meeting Report, Annex 13), the low penetration rate proves the existence of technological barriers to the implementation of wind power technology in the Azerbaijan energy sector. Energy generation by thermal power plants and hydropower plants remains business as usual in Azerbaijan and evidently do not face barriers to implementation.

The project developers Aztorq and Caspian Management Systems have little technological know-how and no previous experience in implementing a wind farm project. The nature of the companies, their former experience and the need to contract experienced companies from abroad for the project development confirm this barrier, in accordance with the "Guidelines for the Objective Demonstration and Assessment of Barriers" (EB 50 Meeting Report, Annex 13):

The project developers and their umbrella company General Construction Holding are Azerbaijan-based private companies, whose company nature lies within the construction and investment activities in the industrial, energy (hydro), agricultural and tourism sector.[35] Due to the lack of experience and technological knowledge of the project developer, but also related to the fact that the Azeri wind energy sector is undeveloped,[36] Aztorq and Caspian Managements Systems rely heavily on foreign companies in the development of the proposed project. All main components of the proposed wind farm, from logistics, to foundation work, construction, quality assurance and engineering have been handled by foreign companies like CCC Machinery, Conferdo, Airwerk, Fuhrlander and Mitaki GmbH.[37]

Further underpinning the existence of technical barriers, is the general lack of local skilled labour in wind energy technologies. The employees involved in the construction and operation of the proposed project did not possess the experience and knowledge required and had to undergo extensive training. An example is the training provided to Azeri employees; project workers were sent to receive training on wind turbines and turbine foundation works in Germany from Conferdo and Fuhrlander.[38]

The absence of wind energy projects in Azerbaijan reveals the existence of barriers to wind energy technology. The implementation of thermal power plants in Azerbaijan, which is common practice in the country, does not face these barriers; Azeri companies and the country in general, have extensive experience in oil and gas energy production, built up over decades. The lack of experience, know-how and skilled labour faced by the project developers in implementing the Yeni Yashma Wind Farm, are thereby clear technological barriers existent in the underdeveloped Azeri wind sector.

The contract between the project developers and the service provider Mitaki GmbH was essential in overcoming the technological barriers faced by Aztorq and Caspian Management Systems in implementing the wind farm project. Central components of the contract and the "General Specifications

[34] Reference: State Statistical Committee of Azerbaijan http://www.azstat.org/statinfo/industry/en/ind46.shtml: of a total power generation of 18,869 mill kWh in Azerbaijan in 2009, 2.1 mill kWh come from wind power.

[35] Reference: Genercon Website: www.gcc.az

[36] As demonstrated in the "Prevailing Practice" barrier section above.

[37] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park (page 10)

[38] Reference: Interviews during validation onsite visit between DOE and project employees.

of the Contract" set up by Mitaki Project GmbH, included the contracting of third parties from Germany for foundation works (Conferdo), engineering (airwerk) and logistics (CCC Machinery).[39][40] Furthermore, the contract and its general specifications establish the provision of trainings for local employees. In the General Specifications of the Contract, the prospects of CDM registration and the resulting income generation are central in demonstrating the project's feasibility.[41] CDM was thereby a vital component of the service contract between the contract parties, for their cooperation agreement and of the establishment of the important technology transfer between Germany and Azerbaijan. CDM was thus crucial for the alleviation of the major technological barriers, being lack of experience and technological know-how, and lack of skilled labour. In accordance with Step 3 of the "Tool for the demonstration and assessment of additionality" (version 5.2) it has hereby been demonstrated that CDM alleviated the technological barriers that prevented the proposed project from occurring.

Based on the requirements of "Tool for the demonstration and assessment of additionality" version 5.2, applying the "Guidelines for the Objective Demonstration and Assessment of Barriers" (EB 50 Meeting Report, Annex 13) and taking note of the guidelines presented under the EB 44 meeting report Annex 10 "Note on the barrier first of its kind", it is clear that the implementation of wind energy is not common practice in Azerbaijan and therefore the proposed project activity is additional

Step 4. Common practice analysis

According to Annex 10 of the 34th Meeting Report of the CDM Meth Panel "Note on the barrier first of its kind" and the "Tool for the demonstration and assessment of additionality" (version 5.2), if a project activity is first of its kind, no additional assessment steps are undertaken to confirm additionality.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Project emissions

In accordance with the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1), no project emissions need to be considered. Project emissions apply only for geothermal power plants, solar thermal power plants and for some hydro power plants. So

$$PE_y = 0 \qquad \textbf{(1)}$$

Where:

PE_y = Project emissions in year y (tCO_2/year)

[39] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park

[40] Reference: Contract with service provider Mitaki GmbH, provided to the DOE.

[41] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park., sections 4.3, 4.4, 8.4, 8.5

Baseline emissions

According to the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1), baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \qquad \textbf{(2)}$$

Where:

BE_y = Baseline emissions in year y (tCO_2/year)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"

The project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield renewable energy power plant). So

$$EG_{PJ,y} = EG_{facility,y} \qquad \textbf{(3)}$$

where

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

There are two main meters for the proposed project, one for each of the project developers Aztorq LLC and Caspian Management Systems:

$$EG_{facility,y} = EG_{Aztorq,y} + EG_{CMS,y} \qquad \textbf{(4)}$$

where

$EG_{Aztorq,y}$ = Quantity of net electricity generation supplied to the grid by the Aztorq LLC units in year y (MWh/yr)

$EG_{CMS,y}$ = Quantity of net electricity generation supplied to the grid by the Caspian Management Systems units in year y (MWh/yr)

So equation (2) and (3) gives equation (2')

$$BE_y = EG_{facility,y} \cdot EF_{grid,CM,y} \qquad \textbf{(2')}$$

For the purpose of calculating combined margin emission factor ($EF_{grid,CM,y}$) the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1) refers to the "Tool to calculate the emission factor for an electricity system" The latest version is version 02. This tool provides the following seven steps to calculate combined margin emission factor:

Step 1. Identify the relevant electric systems.
Step 2. Choose whether to include off-grid power plants in the project electricity system (optional).
Step 3. Select an operating margin (OM) method.
Step 4. Calculate the operating margin emission factor according to the selected method.
Step 5. Identify the cohort of power units to be included in the build margin (BM).
Step 6. Calculate the build margin emission factor.
Step 7. Calculate the combined margin (CM) emissions factor.

Step 1. Identification of the relevant electric power system

According to the "Tool to calculate the emission factor for an electricity system" (version 02), a **project electricity system** has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

Similarly, a **connected electricity system**, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint

The DNA of Azerbaijan has not published a delineation of the project electricity system and connected electricity systems, therefore project participants defined the project electricity system and connected electricity system on the basis of information available.

Energy system of Azerbaijan consists of 20 plants with total installed power production capacity over 6,500 MW. Power plants are interconnected by the distribution network. The distribution network (Project electricity system) has interconnections with electricity systems of Russian Federation, Turkey, Islamic Republic of Iran, Georgia. These connections are operating both for import and export of electricity. Structure of the power grid with existing operational, non-operational and planned interconnection is given in the Figure 2. As it can be seen from the Figure 2 there is an Azerbaijan region – Nakhichevan Autonomous Republic that is not directly connected to the network of the CDM project activity.

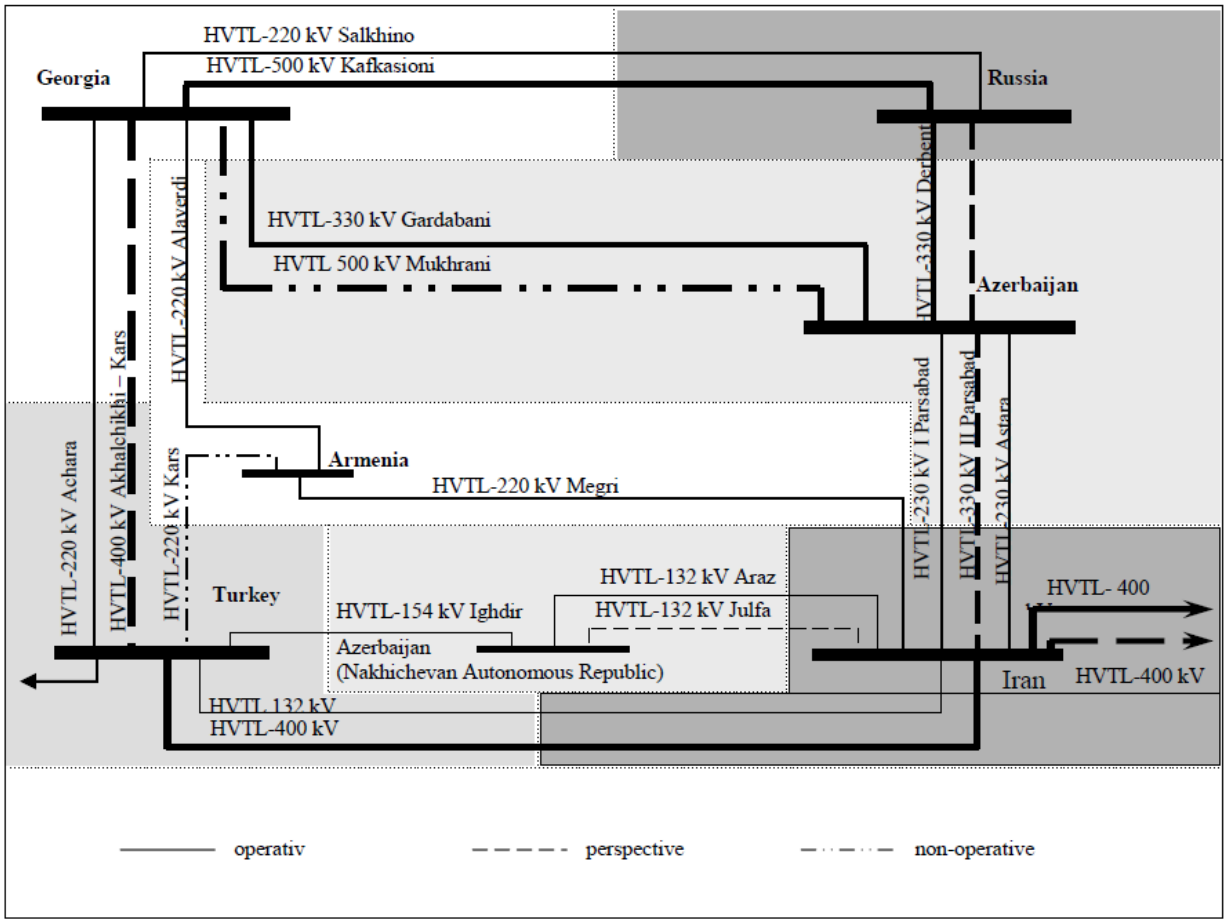

Figure 2. South-Caucasus region Interconnection diagram[42]

According to requirement of the Tool, project participants are using the National electricity grid of Azerbaijan excluding Nakhichevan network as "project electricity system" for the purpose of baseline emissions calculations. Nakhichevan network includes Nakhichevan GTPP, Nakhichevan PP, and Araz HPP.

For the purpose of determining the operating margin emission factor project participants takes into account import of electricity from connected electricity systems (electricity systems of other countries)

[42] **Source:** Report of A. M. Guseynov, N. A.Yusifbeyli "Azerbaijan Power Grid Tasks to Ensure Parallel Operation Efficiency in Market Conditions" at the 4th International Conference "Asian Energy Cooperation: Interstate Infrastructure and Energy Markets" (AEC-2004), Irkutsk, Russia, Sept.13-17, 2004 (http://www.sei.irk.ru/aec/proc2004/12.pdf).

and applies the most conservative emission factor, i.e. EF of imported power is assumed to be equal to 0 tCO_2/MWh as the Tool requires. The connected electricity system consists of Iran, Georgia and Russia.[43]

Also electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional).

The choice is option I: only grid power plants are included in the calculation.

Step 3. Selection of an operating margin (OM) method

According to the "Tool to calculate the emission factor for an electricity system" (version 02), in calculating the operating margin ($EF_{grid,OM,y}$), project developers have the option to select from four potential methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

On order to calculate OM emission factor the project participants select Simple OM. This approach is applicable, because, as it is conditioned in the "Tool to calculate the emission factor for an electricity system", low-cost/must-run resources constitute less than 50% of total grid generation.

Table 6 represents distribution of power generation by different production facilities, i.e. thermal power plants operated using fossil fuels (natural gas and fuel oil) and power plants that are considered low cost/must run according to the Tool. The data are taken for the 5 most recent years available.

Table 6 Distribution of electricity generation (GWh) by thermal and hydro power plants within the grid system of the project boundary[44]

Power source	Year					
	2005	2006	2007	2008	2009	Total
Thermal generation	19,340.4	21,270.4	18,728.9	18,665.7	15,905.6	53,300.2
Low cost/must run	3,007.8	2,513.6	2,258.8	2,162.8	2,211.2	6,632.8
% Low cost/must run	13.46%	10,57%	12.1%	11.6%	13.9%	12.4%

[43] Turkey is not part of the connected electricity system, because there is no direct connection between Turkey and the „project electricity system" (being Azerbaijan excluding Nakhichevan Autonomous Republic), as shown in the map.

[44] Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

The tool gives two options for the calculation of $EF_{grid, OM, y}$:

- Ex-ante option: A 3-year generation–weighted average, based on the most recent data available at the time of submission of the PDD to the DOE for validation, without the requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during the monitoring.

For this project the ex ante approach is selected. Data for calculating the three year average is obtained from the period 2007 – 2009[45] which are the most recent data available at the time of submission of the PDD to DOE.

Power plants that are under validation as CDM project activities are also included in the sample group that is used to calculate the operating margin.

Step 4. Calculating the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must run power plants / units.

This emission factor is calculated using Option B of the Tool, i.e. "Based on the net electricity generation and a CO_2 emission factor of each power unit", as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y})}{EG_y} \qquad \textbf{(5)}$$

where:

$EF_{grid\ OMsimple\ y\ ,}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh);
$FC_{i,y}$	=	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/MWh);
i	=	All fossil fuel types combusted in power sources in the project electricity system in year *y*;
y	=	The relevant year as per the data vintage chosen in Step 3. (2007-2009)

[45] Complete and more recent data of 2010 are not available at the moment of submission of the PDD to the DOE.

Step 5. Identifying the cohort of the power units to be included in the build margin

The sample group of power units *m* used to calculate the build margin consists of either;

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[46].

Option (b) has been chosen to identify the cohort of power units to be included in the build margin as the set of power units comprise the larger annual generation.

The list of the most recent power plants is in section B.6.3 in Table 11.

In terms of vintage of data, project participants can choose between two options: the project participants choose the option 1, where the set of units are determined with the most recent information available at the time of CDM-PDD submission to validation and fixed ex-ante for the complete crediting period.

Step 6. Calculation of the build margin emission factor

The build margin emissions factor is the generation-weighted average emissions factor (tCO_2/MWh) of all power units m during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad \textbf{(6)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emissions factor in year *y* (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of the power unit *m* in year *y* (tCO_2/MWh)

As per the "Tool to calculate the emission factor for an electricity system" (version 02), the CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance from the tool in step 4 for simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which power generation data is available, where *m* is the power units included in the build margin.

The BM calculation is made with A1 for units using A1 in OM and A2 for units using A2 in OM.

[46] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.

Step 7. Calculation of the combined margin emission factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM} \qquad \textbf{(7)}$$

Where:

$EF_{grid,CM,y}$ = Combined Margin emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin emission factor in year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$ = Build margin emission factor in year *y* (tCO_2/MWh)
w_{OM} = Weight of the operating margin emission factor (%)
w_{BM} = Weight of the build margin emission factor (%)

According to the "Tool to calculate the emission factor for an electricity system" (version 02), as the proposed project is a wind farm, the weights for the operating margin and build margin emission factors are by default 0.75 and 0.25 respectively.

Leakage

In accordance with the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1), no leakage emissions are considered.

Emission reductions

In accordance with the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1) to calculate emission reductions the following equation is applied:

$$ER_y = BE_y - PE_y \qquad \textbf{(8)}$$

Where:

ER_y = Emission reductions in year *y* (tCO_2/year)
BE_y = Baseline emissions in year *y* (tCO_2/year)
PE_y = Project emissions in year *y* (tCO_2/year)

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**ID.1 / EG**
Data unit:	GWh
Description:	Net electricity production by power sources (2005-2009)
Source of data used:	Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml The distribution of electricity generation by primary energy resources and the electricity utilities in Azerbaijan (2005, 2006, 2007, 2008, 2009).
Value applied:	Table 9
Justification of the choice of data or description of measurement methods and procedures actually applied :	The State Statistical Committee of Azerbaijan is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	This parameter is over the last 5 years of available data and it is required for the calculation of the proportion of low-cost / must run generation (step 3)

Data / Parameter:	**ID.2 / $EG_{m,y}$**
Data unit:	GWh
Description:	Net electricity production by power plants m in year y (2008)
Source of data used:	Azerenerji (Azerbaijan Electricity Transmission Company); publicly available information available at: http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html The distribution of electricity generation by primary energy resources and the electricity utilities in Azerbaijan (2008).
Value applied:	Table 10
Justification of the choice of data or description of measurement methods and procedures actually applied :	Azerenerji is the Azerbaijan Grid Operator and the largest electrical power producer in Azerbaijan. It is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	This parameter is over the last year of available data and it is applied for the calculation of the build margin emission factor (step 6)

Data / Parameter:	ID.3 / $FC_{i,m,y}$
Data unit:	1,000 m^3 for natural gas tons for fuel oil
Description:	Amount of fossil fuel consumed in the project electricity system by generation sources (2006-2008)
Source of data used:	State Statistical Committee of Azerbaijan: http://www.azstat.org/statinfo/balance_fuel/en/2_10en.xls (low sulphur fuel oil) http://www.azstat.org/statinfo/balance_fuel/en/2_11en.xls (high sulphur fuel oil) http://www.azstat.org/statinfo/balance_fuel/en/2_18en.xls (natural gas)
Value applied:	Table 7
Justification of the choice of data or description of measurement methods and procedures actually applied :	State Statistical Committee of Azerbaijan is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	ID.4 / Electricity Imports
Data unit:	GWh
Description:	Electricity transfers from connected electricity systems to the project electricity system by years (2006-2008)
Source of data used:	State Statistical Committee of Azerbaijan: http://www.azstat.org/statinfo/balance_fuel/en/2_21en.xls
Value applied:	Table 8
Justification of the choice of data or description of measurement methods and procedures actually applied :	State Statistical Committee of Azerbaijan is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	ID.5 / $NCV_{i,y}$
Data unit:	TJ/(million m^3) for natural gas TJ/1000t for Fuel Oil
Description:	Net calorific value (energy content) of fossil fuel type i
Source of data used:	State Statistical Committee of Azerbaijan / calculated
Value applied:	Natural Gas: 38.94 TJ/ million m^3 Fuel Oil (low sulfur): 42.48 TJ/1000t Fuel Oil (high sulfur): 41.20 TJ/1000t
Justification of the choice of data or description of measurement methods	State Statistical Committee of Azerbaijan is the official source for the related data, hence providing the most up-to-date and accurate information available.

and procedures actually applied :	
Any comment:	The State Statistical Committee provides data of FC multiplied by NCV: the fossil fuel consumption is already expressed in TJ.

Data / Parameter:	**ID.6 / $EF_{CO2,i,y}$**
Data unit:	t CO_2/TJ
Description:	Default CO_2 emission factor of fossil fuel type i
Source of data used:	IPCC lower bound of confidence interval, as per Volume 2, Chapter 1, Table 1.4 of the IPCC Guidelines 2006 for GHG Inventory
Value applied:	Natural Gas: 54.3 tCO_2/TJ Fuel Oil (low sulfur): 75.5 tCO_2/TJ Fuel Oil (high sulfur): 75.5 tCO_2/TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no information on the fuel specific default emission factor in Azerbaijan, hence, IPCC values has been used as referred in the "Tool to calculate the emission factor for an electricity system" (version 2).
Any comment:	

Data / Parameter:	**ID.7 / Data on most recent built plants**
Data unit:	Name of the plant; Generation (GWh) and fossil fuel consumption (mass and volume units) Commissioning date
Description:	Capacity additions to the grid that comprises 20% of the total generation (2008)
Source of data used:	Azerenerji (Azerbaijan Electricity Transmission Company); publicly available information at: http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html
Value applied:	Table 11
Justification of the choice of data or description of measurement methods and procedures actually applied :	Azerenerji is the Azerbaijan Grid Operator and the largest electrical power producer in Azerbaijan. It is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	ID.8 / $EF_{grid,CM}$
Data unit:	tCOe/MWh
Description:	Combined Margin emission factor
Source of data used:	Official utility documents/calculated
Value applied:	0.617
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated *ex-ante* in section B.6.3 according to the "Tool to calculate emission factor for an electricity system" version 02, EB50 Annex 14.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

For the purpose of calculation of emission reductions, the following steps have to be applied:

Calculation of the Simple Operating Margin Emission Factor ($EF_{grid,OM,}$)
For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i,y}$) is taken from publicly available documents of the State Statistical Committee of Azerbaijan, which is the official source of related data.[47] The fuel consumption values for relevant years are given in Table 7 below.

Table 7. Fuel consumption of generation sources connected to the grid (2007-2009)[48]

Fuel	Unit	2007	2008	2009	Total
Fuel oil - low sulfur	TJ	43,134.2	19,192.5	5,492.7	**67,819.4**
Fuel oil - high sulfur	TJ	1,779.9	0.0	0.0	**1,779.9**
Natural gas	TJ	175,933.6	196,259.2	171,747.7	**543,940.5**

The electricity imported from the neighbouring countries of the project electricity systems are presented in Table 8.

Table 8 Electricity imports [49]

	GWh		
	2007	2008	2009
Total Imports	**360.0**	**142.2**	**42.6**

The electricity generated to the grid by all power sources serving the system, not including low-cost / must run power plants / units ($EG_{,y}$) is obtained from Azerbaijan State Statistical Committee. Table 9

[47] Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

[48] For further information please refer to section B.6.2.

[49] Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

shows the electricity production for 2007-2009 produced by fossil fuel power sources, and by the other sources.

Table 9. Net electricity generated and delivered to grid by all power sources serving the system 2007-2009[50]

Power Source		2007	2008	2009	Total
Thermal PP	GWh	18,728.9	18,665.7	15,905.6	
LCMR	GWh	2,258.8	2,162.8	2,211.2	
Imports	GWh	360.0	142.2	42.6	
Total non LCMR + imports	**GWh**	**19,088.9**	**18,807.9**	**15,948.2**	**53,845.0**

The simple operating margin emission factor $\mathbf{EF_{grid,OM,}}$, is calculated through equation (5) with the data from table 7, table 8 and table 9 as **0.646 tCO_2-eq/MWh**.

Calculation of the Build Margin Emission Factor ($EF_{grid,BM,}$)

For the calculation of the build margin, the power plants are sorted in chronological order of commissioning date. The most recent plants constituting altogether at least 20% of the total generation of the project electricity system are presented in table 11. The below table 10 presents the data applied for the calculation of the $EF_{grid,BM}$. This data derives from Azerenerji, which is the main Azerbaijan grid operator and the largest electrical power producer in Azerbaijan.

Table 10. List of all power plants for determination of the power plants included in the build margin; their respective electricity generation and fuel consumption in 2008 [51]

Power Plants	Commissioning date	Electricity Generation (GWh	Natural Gas consumption (1,000 m3)	Fuel consumption (t)	Emission of greenhouse gas (tCO2e)
Azerbaijan ThPP	1981	9,185.04	2,341,353.00	366,633.00	5,546,420.58
Shirvan ThPP	1962	4,135.31	1,404,027.00	85,206.00	2,912,810.66
Shimal CCPP	1960	2,675.37	511,229.00	0.00	965,400.29
Sumgait CCPP	2003	308.97	78,174.00	0	147,623.09
Baku ThEC	1973	464.08	194,803.00	0.00	367,864.25
Samgachal PP	2008	19.78	4,118.00	0.00	7,776.39
Baku PP	2007	621.13	147479	0.00	278,498.03
Shahdag PP	2009	0.00	0.00	0.00	0.00
Astara PP	2006	421.34	96,519.00	0.00	182,265.62
Sheki PP	2006	333.89	79,727.00	0.00	150,555.76
Khachmaz PP	2006	410.40	96,582.00	0.00	182,384.59

[50] Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

[51] Reference: Azerenerji (Azerbaijan Grid Company); publicly available information at http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html

Subtotal Thermal PP		**18,575.31**	**4,954,011.00**	**451,839.00**	**10,741,599.26**
Total imports		142.20			
Mingechaur	1953	937.60			
Varvara	1954	78.83			
Shemkir	1982	833.16			
Yenikend	2000	297.85			
Ter-Ter	1976	0.00			
Vaykhur	2006	2.70			
Other non-Azerenerji hydros	Unknown[52]	15.40			
Subtotal Hydro PP		**2,165.54**			
Total		**20,883.05**	**4,954,011.00**	**451,839.00**	**10,741,599.26**
Total excluding LCMR		**18,732.91**	**4,954,011.00**	**451,839.00**	**10,741,599.26**

Table 11. List of most recent power plants included in the build margin and their respective electricity generation in 2008. [53]

Power Plants	Commissioning date	Electricity generation 2008 (GWh)
Sangachal PP	2008	19.78
Baku PP	2007	621.13
Vaykhur HPP	2006	2.70
Khachmaz PP	2006	410.40
Sheki PP	2006	333.89
Astara PP	2006	421.34
Yenikend HPP	2003	297.85
Sumgait CCPP	2003	308.97
Other non-Azerenerji hydros	Unknown[54]	15.40
Shemkir HPP	1982	833.16
Azerbaijan ThPP	1981	9,185.04

[52] Date of commissioning is unknown. It is conservatively assumed to be among the most recent plants. Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

[53] Reference: Azerenerji (Azerbaijan Grid Company); publicly available information at http://cdm.unfccc.int/Projects/Validation/DB/QN34CE32BQQGD2QMYJ6YY3JHH3CQ7I/view.html

[54] Date of commissioning is unknown. It is conservatively assumed to be among the most recent plants. Reference: The State Statistical Committee of Azerbaijan, www.azstat.org/statinfo/balance_fuel/en/index.shtml

The build margin emission factor $\mathbf{EF_{grid,BM,y}}$ is calculated through equation (6) with the data from table 10 as **0.529 tCO_2-eq/MWh**.

Calculation of the Emission Factor Combined Margin ($\mathbf{EF_{grid, CM}}$)

The $\mathbf{EF_{grid, CM,y}}$ is calculated through equation (7) as **0.617 tCO_2-eq/MWh.**

Project emissions

The proposed project activity involves the generation of electricity by development of a wind farm. The generation of electricity does not result in greenhouse gas emissions and therefore PE_y = 0 tCO_2-eq/year.

Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage does not has to be taken into account and LE_y = 0 tCO_2-eq/year.

Emission reductions

The ex-ante emission reductions are calculated based on the amount of electricity generated by the grid that is displaced by the project activity. Due to both project emissions and leakage are zero, the equation (2') and (8) are adjusted and emission reductions are calculated as follows:

$$ER_y = BE_y = EG_{facility.y} \cdot EF_{grid,CM} \qquad \textbf{(9)}$$

Where:

ER_y = Emission reductions in year *y* (tCO_2/year)
BE_y = Baseline emissions in year *y* (tCO_2/year)
$EG_{facility,y}$ = Electricity supplied by the project activity to the grid (MWh)
$EF_{grid,CM,}$ = Combined margin emission factor for grid connected power generation (tCO_2-eq/MWh)

The Project will generate **196,000 MWh/year** of electricity, which will be delivered to the grid.[55]
The combined margin emission factor is calculated as **0.617 tCO_2eq/MWh**.

As per equation (9), the annual emission reductions of the Project are **120,898 tCO_2eq**.

[55] Reference: Mitaki Project GmbH 2009: Memorandum for Yeni Yashma Wind Park

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tCO_2-eq)	Estimation on baseline emission (tCO_2-eq)	Estimation of leakage (tCO_2-eq)	Estimation of overall emission reduction (tCO_2-eq))
01/09/2011-31/12/2011	0	40,299	0	40,299
2012	0	120,898	0	120,898
2013	0	120,898	0	120,898
2014	0	120,898	0	120,898
2015	0	120,898	0	120,898
2016	0	120,898	0	120,898
2017	0	120,898	0	120,898
01/01/2018-31/08/2018	0	80,599	0	80,599
Total	0	846,285	0	846,285

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**ID.9 / $EG_{facility,y}$**
Data unit:	MWh
Description:	Annual electricity supplied by the Proposed Project to the grid
Source of data to be used:	The sum of the Energy meter of Aztorq LLC ($EG_{Aztorq,y}$) and the energy meter of Caspian Management System ($EG_{CMS,y}$).
Value applied for the purpose of calculating expected emission reductions in section B.5	196,000 MWh/year[56]
Description of measurement methods and procedures to be applied:	See $EG_{Aztorq,y}$ and $EG_{CMS,y}$.
QA/QC procedures to be applied:	See $EG_{Aztorq,y}$ and $EG_{CMS,y}$.
Any comment:	The detailed procedures are described in section B.7.2.

Data / Parameter:	**ID.10 / $EG_{Aztorq,y}$**
Data unit:	MWh
Description:	Annual electricity supplied by the Aztorq LLC units to the grid
Source of data to be used:	Two energy meters (primary and secondary) working parallel and installed in the main switchgear station.
Value applied for the purpose of calculating expected emission reductions in section B.5	98,000 MWh/year[57]
Description of measurement methods and procedures to be applied:	The measurements will be performed by two measuring devices, which are the main (primary) measuring device and the backup (secondary) measuring device. The measuring frequency of both devices is continuous and will be recorded on a monthly basis.
QA/QC procedures to be applied:	The metering devices will be calibrated and sealed by the transmission company Azerenerji. Regular maintenance of devices will be performed periodically by Azerenerji. In case of failure of the primary meter, the secondary meter will be used as backup.
Any comment:	The detailed procedures are described in section B.7.2.

[56] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park

[57] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park

Data / Parameter:	ID.11 / $EG_{CMS,y}$
Data unit:	MWh
Description:	Annual electricity supplied by the Caspian Management Systems units to the grid
Source of data to be used:	Two energy meters (primary and secondary) working parallel and installed in the main switchgear station.
Value applied for the purpose of calculating expected emission reductions in section B.5	98,000 MWh/year[58]
Description of measurement methods and procedures to be applied:	The measurements will be performed by two measuring devices, which are the main (primary) measuring device and the backup (secondary) measuring device. The measuring frequency of both devices is continuous and will be recorded on a monthly basis.
QA/QC procedures to be applied:	The metering devices will be calibrated and sealed by the transmission company Azerenerji. Regular maintenance of devices will be performed periodically by Azerenerji. In case of failure of the primary meter, the secondary meter will be used as backup.
Any comment:	The detailed procedures are described in section B.7.2.

B.7.2 Description of the monitoring plan:

All monitoring procedures and requirements of the Aztorq and Caspian Management Systems Wind Farm Project are in accordance with the methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 12.1). Due from the payback of the project depends on the electricity delivered to the grid, the meters have to be accurate, reliable and continuously measuring the electricity delivered to the national grid and thus can be considered as representative.

Metering:
The amount of electricity generated by the project and delivered to the national grid will be monitored continuously. One main and one spare electricity meter is available per company. The measurements will be made in the main switchgear stations at 20 kV medium voltage level at the project site. The meters will measure the net electricity delivered to the grid. Data obtained from measurements will be used in calculations of emission reductions. The losses before this point will be on the account of the project owners.

Meter readings:
Once a month, officials from Azerenerji (Azerbaijan Electricity Transmission Company) will perform data readings under the surveillance of responsible staff from Aztorq and Caspian Management Systems,

[58] Reference: Mitaki Project GmbH 2009: General Specifications of the Contract 09-99-01 and 09-99-02 of the Yeni Yashma I Wind Park

at the respective meters of each company. An invoice (receipt of sale) will be prepared by Aztorq and Caspian Management Systems, respectively, and delivered to Azerenerji for each month.

Data storage:
Data will be stored electronically, during the crediting period and at least two years after the last issuance of CER credits for the wind farm project activity in the concerning crediting period. Both Azerenerji and Aztorq and Caspian Management Systems will be responsible for storage of data received from the measuring devices.

Quality assurance and quality control:
All metering devices will be calibrated and sealed by Azerenerji and thus Aztorq and Caspian Management Systems cannot intervene within meters. The specification of the meters will be in compliance with the requirements of the host country. In case of failure of the primary meter, the secondary meter will be used as backup.

Monitoring frequency:
A high level of accuracy of the measurements will be achieved due to the use of high-precision equipment and due to strict compliance with the recommendations for calibration frequency of the equipment provider. The meters will measure continuously and will be recorded on a monthly basis.

Scope of responsibility:

Responsibility	**Azerenerji**	**Aztorq**	**Caspian Management Systems**
Data readings	Yes	Yes	Yes
Invoice preparation and delivery	No	Yes	Yes
Data storage	Yes	Yes	Yes
Reporting of any malfunction of metering devices	Yes	Yes	Yes
Calibration of metering devices	State Standard	State Standard	State Standard
Maintenance of metering devices	State Standard	State Standard	State Standard
Preparation of monitoring report	No	Yes (with the support of orbeo)	Yes (with the support of orbeo)

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

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Date of completion of the application of the baseline study and monitoring methodology:
12/05/2011

Name of the person and entity determining the baseline and monitoring methodology:

Anne Hem
Orbeo
anne.hem@orbeo.com
T: +49 221 5000 3932

Ömer Akyürek
Oak Consultancy
oak@oakdanismanlik.com
T: +90 216 3471671

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
17/11/2009, which is the date of effectiveness of the equipment sales contract with the service provider.

C.1.2. Expected operational lifetime of the project activity:

>>
25 years

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

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01/09/2011 or the registration date, whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

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D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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A Document of Evaluation of Environment Impact (EEI) was completed in 2010 in conformity to the "Regulation on the process of evaluation of environment impact in Azerbaijan", and in accordance with instructions of the World Bank and provisions of the Directives of the European Union on the Evaluation of Environmental Impact. The report was submitted to the Department of State Expertise of Ministry of Ecology and Natural Resources for their opinion and approval. Based on this evaluation, the Ecological Passport was issued by the above-mentioned industry in July 2010. This is an approval based on the Azerbaijan Law "on Protection of environment"[59].

The EEI presents the current ecological features of the region in which the project activity is located. Furthermore it evaluates the impacts of the project activity both during the preparatory phase, the construction phase and the operational phase. The analysis allows an estimation of the impact of the project on flora, fauna, soil, hydrology and the impact of noise and construction wastes.

The main conclusions of the EEI on ecological impacts are the following:

Impact on soil conditions: The project will have little impact on the soil. In the preparatory stage, any soil collected from the site surface at the sites will be returned after completion of the work. The impact on soil will therefore be short term and local.

Flora and fauna: Flora and fauna n the preparatory and construction phases, it is expected that fauna is impacted on a short term due to the use of machines and equipment, and digging works. There is a possibility that trees may be moved, but in conformity with relevant regulations. No trees will be cut down. As to the operational phase, there is a low presence of birds in the area, and the potential of nest building in the area is minimal.

Emissions to air: The project is expected to have minimal impacts on the environment. The impact is connected to emissions from transport, dust from construction works and flying gases; organic compounds formed at painting and welding works. Due to the proximity to the highway and oil and gas industrial grounds, the pollution from the project can be considered negligent.

Noise impact: The expected noise and vibration levels during construction and operation are not expected to exceed 80 dB (noise) and 50 dB (vibration), which are below the noise norms.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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In concluding the Evaluation of Environmental Impact, the impacts on the environment are considered minimal. The EEI elaborately explains the various impacts of project implementation, as mentioned in the

[59] Decision of Council of Ministries of Azerbaijan Republic No 122, dated 03/03/1992, DUIST 17.0.0.04-90.

above section, and provides detailed information on the reduction of these impacts and the measures which will be carried out to minimize the level of impact.[60] In addition, an extensive waste management plan has been developed to reduce the impact on the surroundings.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

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As outlined in the Law on Environmental Protection (Law on EP), the main stakeholders to the Environmental Impact Assessment process in Azerbaijan are the Developer, the Environmental Authority, the Experts and the public.

The Developer (Project Participant) is responsible for completion and submission of the application for the environmental permission and all related fees for undertaking an Evaluation of Environment Impact (EEI) and public consultations.

The Environmental Authority (Ministry of Ecology and Natural Resources) responsibility includes reviewing applications, consultation with experts, making initial public inquiries, informing the developer on the required depth of the EEI process, setting the Environmental Review Expert Group and announcing the results to the public, attaching any necessary environmental performance related conditions to the Environmental Permission.

The Experts, comprising the EREG, are responsible for undertaking the EEI process according to the field of their expertise analysing all applications and comments received from the public, as well as drawing its own conclusion on the proposed project activity.

The Public is generally "anyone who is in any way affected by the project activity or shows a genuine interest in the project activity".

In line with the legal requirements in Azerbaijan, the stakeholders consultation was a part of the EEI process conducted by the Ministry of Ecology and Natural Resources and the Department of State Expertise before the implementation of the project activity as required by the Law. The stakeholder consultation was carried out on the 10 July 2010. The main purpose of the meeting was to discuss the EEI document and obtain the comments from the stakeholders. 16 participants attended the meeting. Participating at the public consultation meeting for the proposed project were representatives from various stakeholders groups like the government, village, hospital, school and project employees.

The meeting was opened by the chairman of the meeting, the Chairman of Gilazi municipality, who presented the main issues on the agenda. Then, a representative of Caspian Management Systems provided a description of the Evaluation of Environment Impact document. A discussion followed, in which the stakeholders were given the opportunity to comment and ask questions.

[60] See Evaluation on Environment Impact, section 7.

E.2.	Summary of the comments received:

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The comments received revolved around the topics noise impact, waste and water management and employment. The stakeholder participants were explained that the noise levels during exploration and construction will be below accepted norms, and that measures will be taken to reduce the noise levels: using mufflers when using heavy machinery and restricting working hours to the day-time. All wastes resulting from the construction processes will be managed according to the law. Water used during construction will be collected and sent to the nearest water treatment plant. As to employment opportunities, the project will employ local citizens, dependant on their qualifications and skills.

The result of the discussion was that the impact of the wind farm that quantitative and qualitative indicators of air, water, soil, fauna and flora could be considered acceptable. The project will comply with environmental norms and meet accepted guidelines. The implementation of the project will not influence the environment and health in a negative way.

E.3.	Report on how due account was taken of any comments received:

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There were no critical comments from the stakeholders on the project or the Evaluation of Environmental Impact document which required any modifications of the EEI or the project.

Therefore, based on the outcomes from the EEI process the Department of State Expertise of Ministry of Ecology and Natural Resources provided permission to the project activity. This is an approval based on the Azerbaijan Law "on Protection of environment"[61].

[61] Decision of Council of Ministries of Azerbaijan Republic No 122, dated 03/03/1992, DUIST 17.0.0.04-90.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Aztorq LLC
Street/P.O.Box:	44 J.Jabbarly street
Building:	Caspian Plaza
City:	Baku
State/Region:	Baku
Postcode/ZIP:	AZ 1065
Country:	The Republic of Azerbaijan
Telephone:	+994 12 436 84 90/91
FAX:	+994 12 436 84 92
E-Mail:	office@gcc.az
URL:	www.gcc.az
Represented by:	Huseynov Azad
Title:	Director
Salutation:	N/A
Last name:	Huseynov
Middle name:	Abdül Hüseyn
First name:	Azad
Department:	Power Energy
Mobile:	+994 50 330 42 57
Direct FAX:	+994 12 436 84 92
Direct tel:	+994 12 4 36 84 91/92 ext. 224
Personal e-mail:	Huseynov.a@gcc.az

Organization:	Orbeo
Street/P.O.Box:	17 Cours Valmy
Building:	Tour Société Générale
City:	Paris La Defense
State/Region:	
Postcode/ZIP:	92987
Country:	France
Telephone:	+33 (0)1 53 56 61 01
FAX:	+33 (0)1 53 56 61 10
E-Mail:	philippe.rosier@orbeo.com
URL:	www.orbeo.com
Represented by:	Philippe Rosier
Title:	President
Salutation:	
Last name:	ROSIER
Middle name:	
First name:	Philippe
Department:	
Mobile:	

Direct FAX:	+33 (0)1 53 56 61 10
Direct tel:	+33 (0)1 53 56 61 32
Personal e-mail:	registry@orbeo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the Annex I countries is provided to the proposed project.

Annex 3

BASELINE INFORMATION

Please refer to PDD Section B.6. for the baseline information.

Annex 4

MONITORING INFORMATION

No additional information.

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